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Categorizing reptiles in Ancient Egypt: an overview of methods

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ABSTRACT
This work aims to present an overview of the methods that can be used to understand the categorization of reptiles in ancient Egyptian culture. Firstly, the widespread practice of using determinatives (classifiers) is here applied to the case of a fragment from the temple of Djedkara, where the word *ḥfȝ.w* is written with the classifier of the lizard. It is suggested that *ḥfȝ.w* has been not be used to indicate a snake here, but rather a similar reptile. The second part makes comparison between lists, which were a way to organize and summarize knowledge. Two texts are here presented in order to better understand the possible clusters and hierarchization of snakes: the Brooklyn papyrus 47.218.48 and .85 (*Traité d'ophiologie*) edited by Sauneron, which contained in its first part a list of snakes with their description, and the section about snakes in the *Theriaká* of Nicander of Colophone, which permits a cultural comparison with the Greek world regarding the organizing principles of the reptile world. Finally, a statistical study then presented which analyses Egyptian words meaning "snakes" (*jm.j-tȝ*, *fnṯ*, *sȝ-tȝ*, *ḥfȝ.w*, *ḏdf.t*), as found across different time periods and genres of text, which attempts to establish the specific field of use of each word.

KEY WORDS
Reptiles,
snakes,
categories,
lists,
Djedkara Isesi,
Egyptian Treaty of ophiology,
Nicander of Colophone,
basilisk.

RÉSUMÉ
Catégorisation des reptiles dans l'Égypte antique : un aperçu des méthodes.
Ce travail vise à présenter un aperçu des méthodes qui peuvent être utilisées pour comprendre les catégories des reptiles dans la culture de l'Égypte antique. Tout d'abord, l'utilisation déjà bien connue des déterminatifs (« classifiers ») est appliquée au cas particulier d'un fragment du temple de Djedkarê, où le mot *ḥfȝ.w* est écrit avec le classificateur du lézard. Nous suggérons que dans ce cas le mot *ḥfȝ.w* n'a pas été utilisé pour indiquer un serpent, mais peut-être un reptile similaire. La deuxième partie concerne la comparaison entre listes, qui ont été un moyen d'organisation et de récapituler la connaissance. Les deux textes ci-dessous ont été étudiés pour comprendre les possibles groupes et la hiérarchisation des serpents : le papyrus Brooklyn 47.218.48 et .85 (*Traité d'ophiologie*) édité par Sauneron, qui contenait dans la première partie une liste des serpents avec leurs descriptions, et la section sur les serpents du poème *Theriaká* de Nicandre de Colophon, qui permet aussi une comparaison interculturelle avec les Grecs sur les principes d'organisation du monde des reptiles. Enfin, nous présentons une étude statistique des mots égyptiens qui indiquent le serpent (*jm.j-tȝ*, *fnṯ*, *sȝ-tȝ*, *ḥfȝ.w*, *ḏdf.t*) selon les genres textuels et les époques, en essayant de détecter le domaine spécifique d'utilisation de chacun.

MOTS CLÉS
Reptiles,
serpents,
catégories,
listes,
Djedkarê Isési,
Traité égyptien d'ophiologie,
Nicandre de Colophon,
basilic.

INTRODUCTION

Reptiles and snakes undoubtedly played a key role in the ancient Egyptian world. Harmless and dangerous snakes populated the Delta and desert areas, just as they populated the Egyptian netherworld and imagery; lizards were used medicinally; geckos and chameleon were believed to be poisonous (Sauneron 1972; Hansen 2003). Everyone had to deal with these animals in their life and the population thus learned to recognize some of these reptiles' characteristics in order to cope with their dangerousness/usefulness. But reptiles and snakes are also modern concepts affected by contemporary systematic taxonomy. Which features, then, were important and recognized by Egyptians and how were these animals grouped in their minds?

This paper aims to review three different methods, which have been used and can be used in order to reconstruct reptiles categories in Ancient Egypt, while at the same time presenting some case studies.

Abbreviations

Bln	papyrus Berlin 3038 (Bardinet 1995: 409-436);
CAD	*Chicago Assyrian Dictionary*. https://oi.uchicago.edu/research/projects/chicago-assyrian-dictionary-project, last consultation: 26/05/2020;
CDD	*The Demotic Dictionary of the Oriental Institute of the University of Chicago*. https://oi.uchicago.edu/research/publications/demotic-dictionary-oriental-institute-university-chicago, last consultation: 26/05/2020;
Eb	papyrus Ebers (Bardinet 1995);
L	papyrus London (British Museum 10059) (Bardinet 1995: 483-492).

THE USE OF DETERMINATIVES: A BORDERLINE CASE FROM DJEDKARA-ISESI'S FUNERARY TEMPLE

The importance of determinatives in understanding categories in ancient minds has been clearly illustrated by Goldwasser (1999). In this respect, they are better called "classifiers", because they "reflect the way the world is perceived and understood by a certain society or group" (Goldwasser 2006: 3) and suggest "the existence of a class or a category in the Egyptian collective mind" (Goldwasser 2006: 3). In the same way, Baum (1988) had already embraced the use of classifiers for the identification of vegetal species, considering the names accompanied by sign M1  in Gardiner sign list (Gardiner 1950) to be tree species, the ones with sign M2  herbal species, and the names determined sometimes with M1 and sometimes with M2 shrubs. In doing so, she implicitly affirmed that M1 and M2 would have become prototypes of two different classes of vegetal in the Egyptian mind. In a somewhat similar way, Aufrère (2015c) used the hawk and the cobra determinatives to detect what he calls the hawk-paradigm and the cobra-paradigm in the ancient Egyptian notion of "god" and its gender duality (male hawk and feminine cobra). The use of classifiers could also allow us to understand how Egyptians organized the animals that are today enclosed in the category "reptiles". An appropriate example to test this principle is a text appearing on a fragment from Djedkara Isesi's funerary temple, published by Grimm (1985) (Fig. 1)[1].

The fragment: description and problems

Because very few fragments from the pyramidal complex of Djedkara Isesi, king of the fifth Dynasty dated around 2350 BC, have been published, this evidence appears particularly relevant. We are dealing with a finely worked bas-relief, delimitated in its higher part by one empty horizontal stripe and one stripe with stars. This kind of decoration led Grimm (1985: 30) to think that the fragment could be collocated immediately under a starry ceiling. Under the stripes are five large rectangular fields, each one divided into two or three columns of writing. A fragment with stars has been indeed recently published (Megahed *et al*. 2017: 47). This belonged to the ceiling of the final part of the corridor which led to the funerary temple, a provenience that can be suggested, but not confirmed, also for Grimm's fragment.

Little remains of the first field: only the inferior piece of a leg with its foot and, below, part of a kneeling man catching a lizard. Between his legs he seems to have a cylindrical box, maybe to store the same lizard. The meaning of this first register is linked directly with the second one which mentions the capture of reptiles, while the third one mentions 30 pieces of *mnq*-tree and the fourth one gold and electrum (followed by three cities in the South where such ores could be found). Of the fifth and last register just a small trace remains, which may be the word *t3.w* (earth, land). Regarding the interpretation of the text of the fragment, Grimm (1988: 38) thought it could refer to real expeditions; Redford (1986) interpreted it as belonging to the genre of the annals (but unlikely, see Grimm 1988); Betrò (2016: 47), finally, considered it part of a catalogue of natural resources, similar to later *onomastica*. Considering its fragmented nature, a definitive reconstruction is impossible; nevertheless, because "captures" are explicitly mentioned, as well as an exact number of pieces of vegetal material, Grimm's interpretation is the most likely, even if the general idea of a catalogue of places where precious material could be found is possible and does not exclude the third hypothesis.

The second field is the one we are interested in. It is divided into two complete columns of writing (*contra* Redford 1986: 137, 138). The first and the last sign of the first column can be reconstructed on the basis of the remains of an *ḥ*, as well as the classifier that follows on the second column. The text thus says:

"Col. 1 *ḥf3.w*(*w*) *sḫ*[*r*](*t*)
Col. 2 *ḥf3.w*(*w*) *nb*(*w*) *ḫ3st*"
(Lizards: catching all the lizards of the desert).

1. The author was unaware of the forthcoming article of Aufrère (2019) and wishes to apologize for any repetition of information or opinion with respect to his recent paper, thanking him for making a copy available. The author nevertheless hopes this section can contribute to the discussion of this important document. Both agree in stressing that the graphic rendering of the word "snake" in the relief shows its semantic ambiguity, although some further hypotheses regarding the possible identities of the reptile are here presented.

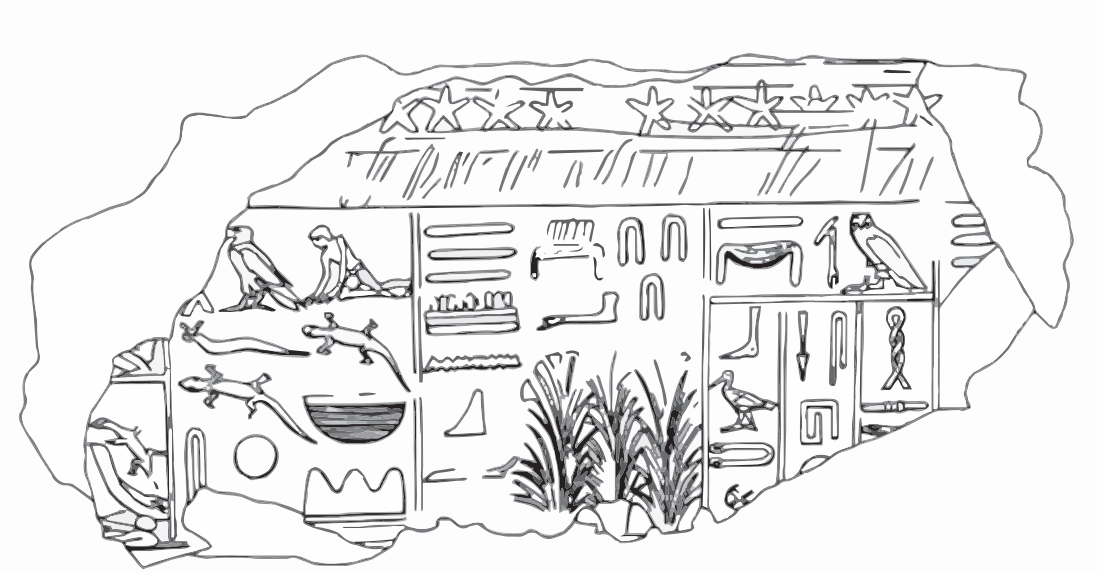

Fig. 1. — Djedkara's relief (Credits: Grimm 1988).

The word *ḫfȝ.w* is written here with a metathesis not unusual for the Old Kingdom, when a tall and narrow sign at the beginning of the word was often preferred (Edel 1955: §92). More importantly, the classifier of *ḫfȝ.w*, normally translated as "snake" ("Schlange"; Grapow 1955b: 72.14-20) is (unconventionally) a lizard (I1 ). While this sign can be normally be read *ʿšȝ* ("viel sein"; Grapow 1955a: 228), a similar reading is hardly sustainable here, because of the presence of *nb*(*w*), which would make the adjective "many" redundant. Furthermore, the "second lizard-sign", which appears in the second column, would have to be read *ḫfȝ.w* in any case, because it indicates the object of the capture mentioned in the title of the register, thus confirming the reading in the first column. Nor can it be speculated that the stonemason here replaced the more usual hieroglyphic sign of the snake (I10 ) with that of the lizard (I1) for reasons of taboo. In texts of the Old Kingdom (including the Pyramid Texts) the snake signs (I9)  and (I10) were used and not yet subject to suppression (see Edel 1955: §81 for examples). It seems that we must admit that the term *ḫfȝ.w* could also be used (occasionally?) in order to designate reptiles other than "snakes" – or that what we distinguish as "lizards" and "snakes" respectively could be conflated in the Egyptian mind. This peculiar phenomenon naturally opens some questions (like the reasons for capturing these animals and the exact nature of these lizards).

A name for the lizard

The ancient Egyptian noun for "lizard" is strongly debated. There are three terms which have been recognized as such: *ʿšȝ*, *ḥntȝsw* and *dmj.t*.

The phonetic writing of I1 is, as we said, *ʿšȝ* ("viel sein"; Grapow 1955a: 228), but this is not normally used with the meaning of "lizard". The only occurrence in this sense seems to be pRamesseum V III.21 (Barns 1956: 31, pl. 21), in a medical text of the New Kingdom for the preparation of an unguent (but see also Guilhou 2009: 11, note e). Besides this, we can rely only on the image of the hieroglyph itself (a lizard or a hybrid of several similar species: see Aufrère 2019) and on its similarity with some forms in Nilo-Saharan languages (cf. mahas: *aza*(*r*), "gecko" [Anselin 2004: 2]). It is possible that the term originally designated the lizard and that later, for reasons of homophony or translation (lizards are numerous in Egypt), the sign I1 became a popular way of expressing numerousness (Kaplony 1966: 65). In Coptic, the term has been transmitted with only this second meaning (*ašai*, "increase, multiply"; Westendorf 2008: 15), while its relationship with the word *ašira* "chameleon" is more doubtful (Černý 1976: 15; Vycichl 1983: 20; Westendorf 2008: 16; Aufrère 2017: 26; 2019: 59).

Otherwise, it is *ḥntȝsw*, classified with I1 , which is normally translated as "lizard", but also "gecko or agama" (Aufrère 2017: 26; 2019: 57). The lexeme occurs, however, only from the XIII Dynasty onwards (Aufrère 2019: 57, footnote 9) and mainly in medical texts (Von Deines & Grapow 1959: 355), and from this derives the Coptic *anthous*,"lizard" (Černý 1976: 8; Vycichl 1983: 12; Westendorf 2008: 9).

Finally, I1 was used during the Greco-Roman era as an ideogram for *dmj.t* (Grapow 1955c: 453.6-455.3), "touch", or as the noun for "city, port" (Grapow 1955c: 456.8-10). Takács (2001: 244) compared this noun to Couchitic (beja: *damba*, lizard), Tchadic (hausa: *damo*, mwulyen [central Tchadic]: *damwaza*, lizard), Sura (*damsar*, gecko) and Nubian (mahasi: *dimo*, chameleon).

Therefore, we do not have any clear proof as to what these reptiles were called before the New Kingdom. The writing of *ḫfȝ.w*(*w*) in the Djedkara relief leads one to think, however, that, at least occasionally, this word could have been applied to indicate, if not all, at least part of the animals which are nowadays under the suborder of Sauria (mostly lizards, agamas, geckos, varans, and skinks). Certainly, nothing allows us to extrapolate common usage from this single occurence, nor to think that words like *ʿšȝ*, *ḥntȝsw*, *dmj.t* could not be used already in this period with the meaning of "lizard". *Ex silentio*

proofs are always fallacious. However, the fact that in our text *ḥf3.w* has been used to designate something other than the normal "snakes" seems indubitable (see also Aufrère 2019: 49).

Moreover, we can also consider that a similar ambiguity in categorizing small reptiles other than snakes is detectable in other ancient languages. In Sumerian, for example, there was no general classifier for "reptile" (Selz *et al.* 2017), but among the compound names of muš ("snake"; Hübner & Reizammer 1985-1986: 698), there are also several names for "geckos" (for example, muš-da-gur4; Hübner & Reizammer 1985-1986: 698). In Akkadian, the reptile denominated muš-ḫul and translated as ḫul-mit-tum (Landsberger 1934: 42), whilst appearing on a list of snakes, is described elsewhere as an animal with feet (Landsberger 1934: 62), hence the uncertainty of the dictionaries (*CAD*: H 230). The Egyptian *k3r3*, even if described as having feet, is classified with the determinative of the snake (see below, paragraph "Clusters of snakes in the Treaty"). The Indo-European root sarp (Pokorny 1959-1969: 912), "kriechen", origin of the Latin "serpens", is used to indicate snakes proper, but also occasionally worms (Pianezzola *et al.* 2004: 1409; Plinius, *HN* VII, 172). In these cases, it seems that the meaning of the "snake" word has been extended to other similar reptiles. Therefore, it seems unsurprising that a lizard or a similar animal could have been designated in the Djedkara relief through a noun we know was mostly used for "snake".

Some identification hypotheses

In the specific case of the relief these lizards are unmistakably located in the desert zone. Furthermore, they are granted a mention together with precious material. The other fields of the relief indeed refer to an expedition for necessary material: wood, gold, silver, electrum – the value of the metal is self-evident, while wood was also a valuable material in a land like Egypt, dominated by desert. On the other hand, how could the lizard represent a valuable material comparable to these, and even require an expedition in the desert to find it? It is reasonable to think that the capture of these lizards had some practical purpose, namely to obtain necessary ingredients, both for food (Aufrère 2019: 49; Pierre Tallet pers. comm.) and for medical purposes. The latter use is well known for such reptiles. In medical texts lizards (*ḥntzsw*) are mentioned in:
– Bln 26: to be cut on one side and spread on the painful point;
– Bln 27: to be stuffed with vegetal tar and salt and to be spread on the head or on a painful point;
– Bln 85 = Bln 82: only as an ingredient, boiled in fat, to be used against the bites of a poisonous animal;
– Eb 370: against the *adet*-formation in the eye; a mixture of lizard excrement with *sja*-mineral, galena, and honey to be spread on the eye;
– Eb 424: to heal a twisted eyelash; mixture of lizard and bat blood;
– Eb 425: to prevent the eyelash from growing back after its extirpation;
– Eb 469: to facilitate the growth of the hair; black lizards to be cooked in fat and to be spread on the scalp;
– Eb 850: to kill a *semet*-animal, as an ingredient for fumigation.

The lizard was thus used either wholly or in its component parts (blood, feces, in oils or poultices to be applied externally). Considering that modern biomedicine ignores the medical properties of these reptiles, it is difficult to verify the exact value of these indications. Part of these could be explained with the homeopathic and allopathic method: the link between reptiles and eyes is evident for example in Greek, where δρακών, which comes from the same root as the verb δέρκομαι (to see), can designate a big snake. Indeed, their lack of eyelids, which makes their glances intense, could have promoted the belief of the curative properties of their eyes. On the other hand, a possible antagonism between the lizards and the unknown *semet*-animals could stand behind their use in fumigations against them. The use of a black lizard for hair growth, could perhaps recall the colour of healthy black hair. Plinius indicates the use of lizards (Latin *lacerta*) in medicine against the poison of salamanders (Plinius, *HN* XXIX, 76), against the stings of scorpions (Plinius, *HN* XXIX, 91), against rabies bites (Plinius, *HN* XXIX, 102), against hair loss (Plinius, *HN* XXIX, 108), to prevent the growth of an eyelash (maybe after its extirpation; Plinius, *HN* XXIX, 116), against glaucoma (Plinius, *HN* XXIX, 118), in other ophthalmic recipes (Plinius, *HN* XXIX, 129) or against contusions of the ears (Plinius, *HN* XXIX,135). Dioscorides (*De materia medica* II, 64) suggests the use of a lizard cut along one side against the stings of scorpions, and the head of a lizard to extract splinters, remove warts, and for liver pain. The *ḥntzsw*-lizard mentioned in medical papyri probably belongs to all kinds of species of the genus Lacertidae (and even beyond) without a specific distinction that we would be able to detect, but the snake-lizards of the fragment of Djedkara could represent something more specific because of their desert habitat.

According to Baha El Din (2006) the suborder Sauria embraces in Egypt at least six families (five according to Anderson 1898-1907: lix-lx = suborder Lacertilia): Gekkonidae, Agamidae, Chamaeleonidae, Lacertidae, Varanidae and Scincidae (see Figs 2; 3). For an animal called *ḥf3.w* and classified with a lizard, we could expect either a reptile or a kind of snake, usable in medical practice. Even if we cannot completely exclude lizards *stricto sensu*, geckos, agamas and chameleons (one of which has been supposed to appear at the end of the snakes' list of *Traité d'ophiologie* [Sauneron 1989], see below), the most logical solution appears to be the Scincidae, which can be likened to snakes because of their little feet and their habit of hiding under the sand. Moreover, they can be easily boiled in oil or fat. Among the members of the Scincidae well-adapted for life in sandy habitats (the habitat of the relief) are the genera *Scincus* Laurenti, 1768 (Baha El Din 2006: 203) and *Sphenops* Wagler, 1830 (Baha El Din 2006: 205). The skink (*Scincus scincus* Linnaeus, 1758) is a species of lizard, around 10-20 cm long, with black stripes, a body covered in shiny and smooth scales, short legs, and flat yellow feet. It can literally burrow and swim quickly into the sand (Anderson 1898-1907: 205; Baha El Din 2006: 204). It thus shares some commonalities with snakes: the smooth scales, the fluent movement into the sand, the long snout. Furthermore, the feet often remain hidden under the sand and the similarity with a snake thus increases all the more. Their medical use

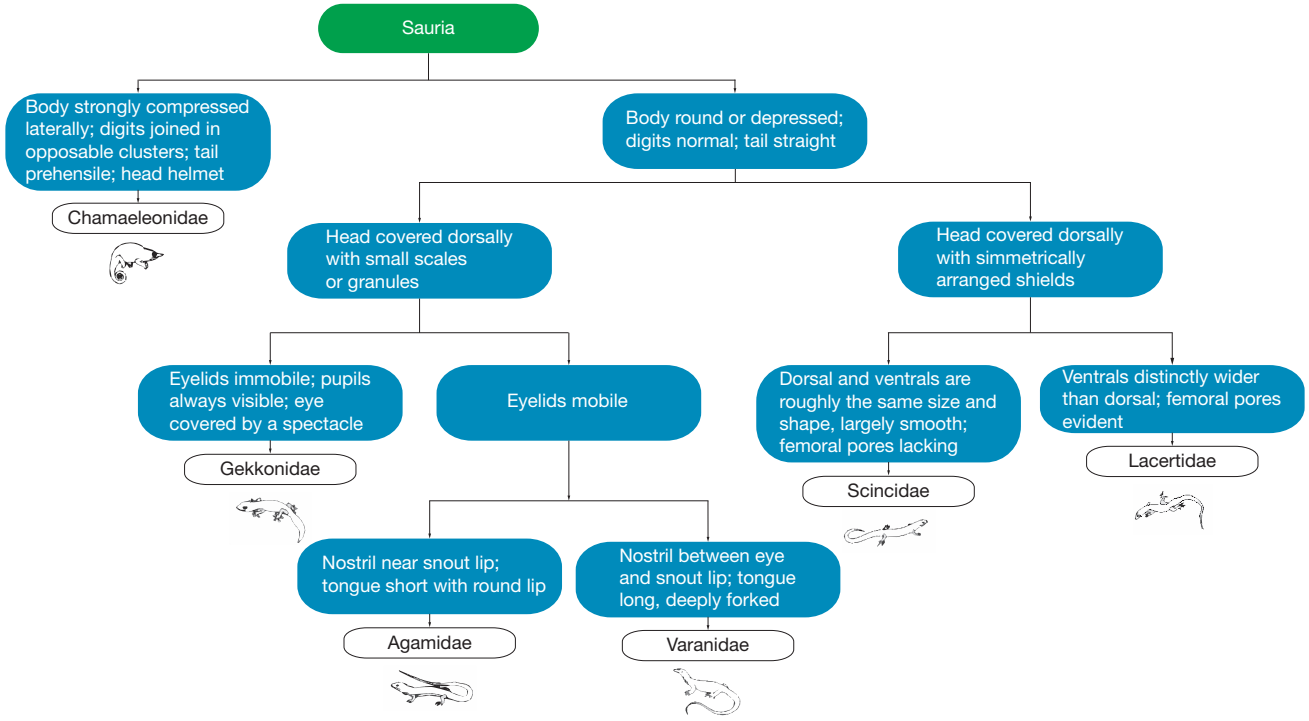

Fig. 2. — Key to families of Egyptian Sauria according to Baha El Din (2006: 48). Images of the reptiles from Townsend *et al*. (2004: 751).

was known also abroad in Greco-Roman times. Dioscorides (*De materia medica* II, 66) indicates two proveniences for the skink used in Europe, namely Egypt and India, and he suggests that they can be used as both antidote and aphrodisiac.

The skinks of the genus *Sphenops* are equally good candidates. These have a longer body than the one of the genus *Scincus*, making them particularly similar to snakes ("overall appearance almost snake-like"; Baha El Din 2006: 205), but are always glossy. The light brown color of the *Sphenops sepsoides* Audouin, 1829 (synonym of *Chalcides sepsoides* Anderson, 1898) helps it camouflage itself on the sand, where its feet almost disappear and where they move as if swimming (Anderson 1898-1907: 220; Baha El Din 2006: 205).

Regarding the possible use of these reptiles as food, it can be noted that skinks provide quite a good amount of protein, and that they are used in southeastern Algeria as substitute for fish (Toumi *et al.* 2016). Otherwise, the flesh of the *Uromastix* spp. (the spiny-tail lizard) is consumed by the Bedouins of the Egyptian Eastern Desert (Goodman & Hobbs 1994: 85). The *Uromastix* species are also typical of desert habitats (Baha El Din 2006: 129), but, if the size of box between the man's legs in the first register is accurate, their quite sturdy dimensions make them unlikely in the specific case of the relief.

Culinary and medical uses, finally, are not mutually exclusive, and may very well complement each other.

Naturally, it is not the author's intention here to support a one-on-one identification between an Egyptian word and a modern species, because such operations are often misleading and other species can be suggested here. I would rather support the idea that the concept of *ḥfȝ.w* could cover more species than only snakes and worms as considered by the *Wörterbuch der ägyptischen Sprache* (Grapow 1955a-c), and that it could have sometimes embraced the reptiles of the family of Scincidae (*Scincus* spp., *Chalcides* spp.), that is, reptiles with an elongated and polished body, with wavy and quick movements and not so evident feet.

Conclusions

The skink may therefore be considered a borderline case between two categories, that of "sworms" (snake + worms, see Goldwasser 2002: 68) and that of lizards: the morphological similarity between these may have led Egyptians to consider two distinct words unnecessary (at least in this case). The determinative I1  put after the name *ḥfȝ* relates to the receiver of the text at a visual level and not grammatically or lexically: his figurative power alone should have been enough for an Egyptian to represent the nature of the animal. Treating it as a classifier, the determinative of *ḥfȝ* should not be considered simply as a repeater, but rather as being in a schematic relationship (Goldwasser 2006: 23) with the preceding name like an extension or specification of its meaning.

The use of classifiers (or determinatives) thus opens wide possibilities in understanding how Egyptians would have conceptually organized the reptiles of their territory.

CLUSTERING REPTILES IN LISTS

Lists have recently received attention from scholars who wish to investigate categories in the ancient mind, and this has occupied researchers from both Egyptology and beyond

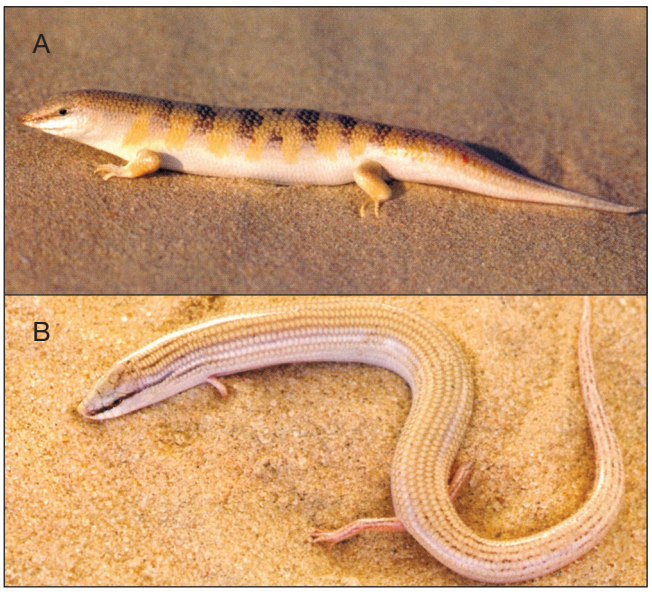

Fig. 3. — **A**, *Scincus scincus* Linnaeus, 1758 and **B**, *Sphenops sepsoides* (synonym of *Chalcides sepsoides* Anderson, 1898), from Baha El Din (2006: figs 73, 75).

(Meeks 2012; Deicher & Maroko 2015; Aufrère 2017; Gerke 2017; Pommerening 2017). Lists are not indeed a mere enumeration of names, but represent a selection of specific entities by their redactor, in their universe of concrete objects and abstract concepts, made according to precise criteria. Lists can thus be considered clusters and they can be used in this way to understand and reveal which entities writers considered to belong to which group. The process of creating lists can be assimilated to the process of categorization and the resulting clusters can be used to understand cultural categories, especially if "category" is meant as "a set of items with a common label" (Ramscar & Port 2015: 78). In another way, lists can be used to study the hierarchization of entities. However, hierarchization is not always present, depending on the level of reflection and effort on part of the redactor of the list: a shopping list is not always fully organized. Consequently, hierarchization can be absent.

It is not the purpose of this paper to enumerate and analyze here all ancient texts where reptiles are listed. I will rather focus on one text, the most important one for our purpose, i.e. the *Traité d'ophiologie*, published by Sauneron (1989)[2], which enumerates about 38 snakes with their descriptions.

Clusters of snakes in the Treaty

The Treaty is first a macro-cluster, grouping snakes which an Egyptian might encounter in his territory, while further subclusters are detectable inside the text. One should firstly underline that the identification of these categories is closely related to the problem of identifying the snake species mentioned. Identifications have been carried out by Sauneron, then by Leitz in his *Schlangennamen* (Leitz 1997), by Nicole Brix in her PhD work (Brix 2011), and by the present author who has personally studied them elsewhere. The main approach to be used here is not considering modern identifications and rather to rely on the characteristics mentioned in the descriptions given by the Egyptian author himself: this prevents us from projecting modern names (that is modern taxonomy) onto ancient classification. The characteristics in the descriptions, or even just the names of the snakes permit in this way to reach quite solid results.

The first cluster which can be detected is that of cobras ([14-] 15-17)[3]. The snake Apophis (15) has the same name as the god represented as a giant snake, who hampers the travel of the solar deity (Ra) every night in the netherworld. His identification in the Treaty with the *Naja pallida* Boulenger, 1896 (the red cobra; but better known today as *Naja nubiae* Wüster & Broadley, 2003) is almost certain because of the numbers of teeth marks its bite leaves (four, and not two like vipers) and the immediate death it causes. Other hypotheses are here feeble. The *gꜣny*-snake (16) is likewise with great probability an elapid. Its bite is said to be like the previous one (it leaves four marks), meaning that snakes 15 and 16 are grouped by the text itself. The prognosis for the *gany*-snake is also strongly negative, and the black color makes the hypothesis of *Naja nigricollis* Reinhardt, 1843 (the black cobra) likely. According to Sauneron (Table 1), it could be *Walterinnesia aegyptia* Lataste, 1887 (another elapid), but this idea is less convincing because this last one is a night and burrowing snake (Baha El Din 2006: 283). Nevertheless, it is today referred to with the common name "cobra of the desert", so this identification cannot be excluded, but it is, in any case, an elapid. The *jḫr*-snake is grouped together with the two previous ones for the prognosis (the bitten man dies immediately), which only appears again in the text in the case of the *ḏw-ḳd* (19). We also know that this snake has a dark color. Leitz suggested the *Naja mossambica pallida* (without author), while Aufrère (2012a: 256) considered that it could be an elapid without further specification (see Table 1). Note that both species suggested for the *gꜣny* could also apply to for the *jḫr*. As for snake number 14, whose name is lost, the description is very fragmentary and its reading uncertain. Nevertheless, Sauneron proposed that he could be a big and dangerous elapid by relying on other texts (Sauneron 1989: 148; see also Aufrère 2012a: 256; 2015a: 48 for a different opinion). In any case, this cannot be taken totally for granted.

The second detectable cluster is that of the two *ḥnp*-snakes (23, 24). The first one is entirely white with a narrow neck and thick tail; the second one is called "red *ḥnp*" and is white with red spots, a narrow neck and thick tail. Generally, none of them are lethal, but the positive prognosis depends for both on the behavior of the patient ("if he does not surrender" [23], "if he does not vomit" [24]). Independently from modern identifications which can vary (see Table 1), they are grouped together by the Egyptian writer himself. Note that the viper *tj-ʿm* (22) which appears just before the white *ḥnp* is said to be similar to this one and but is set apart from all the other vipers. On the other hand, the male viper (31) is said to be like the red *ḥnp* but is still located far away from it.

2. So voluntarily excluding for this paper the new text published by Goyon (2012), because not organized as a list.

3. The numbers relate to Table 1 and to the paragraphs of the edited text.

TABLE 1. — Suggested identifications for the reptiles of the *Egyptian Treaty of Ophiology* (Sauneron 1989). Scientific names are here without author because they are presented this way in the quoted works.

Paragraph	Name of the snake	Note	Identification	Modern family
14	lost	it belongs to the group of *ḫt-wʿt* and *kȝ-nʿy* snakes	Elapid (Sauneron 1989: 147); not identifiable (Leitz 1997: 137); *Naja haje* (Brix 2011: pl. III) Viperidae (Aufrère 2012a: 256)	Elapidae, Viperidae
15	big snake of Apophis		Elapid (Sauneron 1989: 148); *Naja haje* (Leitz 1997: 52); *Naja pallida* (Brix 2011: pl. III) Elapidae (Aufrère 2012a: 256)	Elapidae
16	*gȝny*	bite like the snake of Apophis	*Walterinnesia aegyptia* (Sauneron 1989: 150) *Walterinnesia aegyptia* (Leitz 1997: 62) *Naja nigricollis* (Brix 2011: pl. III) *Walterinnesia aegyptia* Lataste, 1887 (Aufrère 2012a: 256)	Elapidae
17	*jḫr*		*Zamenis*? (Sauneron 1989: 150) *Naja mossambica pallida* (Leitz 1997: 59) *Naja mossambica* (Brix 2011: pl. III) Elapidae (Aufrère 2012a: 256)	Colubridae, Elapidae
18	*kȝ-nʿm*		Asiatic viper (Sauneron 1989: 150); *Vipera ammodytes*, male (Leitz 1997: 108) *Pseudocerastes persicus* (Brix 2011: pl. III) Viperidae, *Pseudocerastes persicus fieldi* Schmidt, 1930 (Aufrère 2012a: 256)	Viperidae
19	*ḏw-ḳd*	small like a lizard	not identifiable (Sauneron 1989: 151) *Echis pyramidum* (Leitz 1997: 84) *Echis pyramidum* (Brix 2011: pl. III) not identifiable (Aufrère 2012a: 256)	Viperidae
20	*sdb*	it belongs to the *msw-bdš* family	*Echis coloratus* (Sauneron 1989: 151) *Psammophis schokari* or *P. sibilans* (Leitz 1997: 40) *Chamaetortus aulicus* (Brix 2011: pl. III) not identifiable (Aufrère 2012a: 256)	Viperidae, Colubridae
21	*nbd*	harmless	Natrix (Sauneron 1989: 152, 164) *Natrix tessellata* (Leitz 1997: 30) *Natrix tessellata* Laurenti, 1768 (Aufrère 2012a: 257) *Atheris hispidus* (Brix 2011: pl. III)	Colubridae, Viperidae
22	(*fy*) *tj-ʿm*		Asiatic viper (Sauneron 1989: 152) *Vipera ammodytes*, female (Leitz 1997: 108) *Cerastus vipera* (Brix 2011: pl. III) Viperidae (Aufrère 2012a: 257)	Viperidae
23	white *ḥnp*	small like a lizard	*Tarbophis obtusus* (Sauneron 1989: 153) *Telescopus fallax hoogstraali* (Leitz 1997: 40) *Macrovipera deserti* (Brix 2011: pl. III) Elapidae (Aufrère 2012a: 257)	Colubridae, Viperidae, Elapidae
24	red *ḥnp*	small like a lizard	Elapid (Sauneron 1989: 154) Elapidae (Aufrère 2012a: 257) *Telescopus dhara* (Leitz 1997: 42) *Macrovipera lebetina* (Brix 2011: pl. III)	Elapidae, Colubridae, Viperidae
25	*nkj*	similar to a lotus stem	*Naja nigricollis* (Sauneron 1989: 154) *Malpolon monspessulanus* (Leitz 1997: 37) *Malpolon monspessulanus* (Brix 2011: pl. III) *Malpolon monspessulanus* Hermann, 1804 (Aufrère 2012a: 257)	Elapidae, Colubridae
26	*fy* (1)	image of the lotus flower on his head	*Echis carinatus* (Sauneron 1989: 155) *Vipera* (*Daboia*) *palestinae* (Leitz 1997: 126) *Atheris nitschei* (Brix 2011: Pl. III) Viperidae (Aufrère 2012a: 257)	Viperidae
27	*fy ntf*		Bitis? (Sauneron 1989: 155) *Echis coloratus* (Leitz 1997: 88) *Echis coloratus* (Brix 2011: pl. III) not identifiable (Aufrère 2012a: 257)	Viperidae
28	*fy ḥr ḏbwj*		*Cerastes cerastes* (Sauneron 1989: 156) *Cerastes cerastes* (Leitz 1997: 64) *Cerastes cerastes* (Brix 2011: Pl. III) *Cerastes cerastes* Linnaeus, 1758 (Aufrère 2012a: 257)	Viperidae
29	*fy šrj*	small viper without horns	*Cerastes vipera* (Sauneron 1989: 155) *Cerastes vipera* (Leitz 1997: 78) *Vipera latasti* (Brix 2011: pl. III) not identifiable (Aufrère 2012a: 258)	Viperidae

Table 1. — Continuation.

Paragraph	Name of the snake	Note	Identification	Modern family
30	*fy* (2)		Viper (Sauneron 1989: 155) not identifiable (Leitz 1997:138) *Causus resimus* (Brix 2011: pl. III) Viperidae (Aufrère 2012a: 258)	Viperidae
31	*fy ṯ3*	male viper, similar to red *ḥnp*	Viper (Sauneron 1989: 155) *Echis coloratus* Günther, 1878 (Aufrère 2012a: 258) *Coluber rhodorachis*? (Leitz 1997: 27) *Psammophis tanganicus*? (Brix 2011: pl. III)	Viperidae, Colubridae
32	*ỉr ỉr*		*Naja haje*? (Sauneron 1989: 157) *Malpolon moilensis* (Leitz 1997: 35) *Malpolon moilensis* (Brix 2011: pl. III) not identifiable (Aufrère 2012a: 258)	Elapidae, Colubridae
33	*ḥf3 ntf* (*fy*)		*Echis carinatus* (Sauneron 1989: 155) *Pseudocerastes persicus* (Leitz 1997: 98) *Bitis arietans* (Brix 2011: pl. III) Elapidae (Aufrère 2012a: 258)	Viperidae
34	lost	not so dangerous	not identifiable (Sauneron 1989: 157) not identifiable (Leitz 1997: 139) *Telescopus tripolitanus*? (Brix 2011: pl. III) not identifiable (Aufrère 2012a: 258)	Colubridae or other (but not Elapidae or Viperidae)
35	*r3-bḏḏ*	not clear	Elapidae (Sauneron 1989: 158) not identifiable (Leitz 1997: 139) not identifiable (Brix 2011: pl. III) not identifiable (Aufrère 2012a: 258)	Elapidae or other
36	*sdbw*	harmless	*Psammophis sibilans* (Sauneron 1989: 159) *Coluber jugularis* (Brix 2011: pl. III) *Psammophis sibilans* Linnaeus, 1758 (Aufrère 2012a: 258) *Eryx jaculus* (Leitz 1997: 22)	Colubridae, Boidae
37	lost	harmless	*Psammophis schokari* (Sauneron 1989: 160) *Coluber nummifer*? (Leitz 1997: 25) *Psammophis biseriatus*? (Brix 2011: pl. III) Colubridae (Aufrère 2012a: 258)	Colubridae
38	*k3r3*	not a serpent	Chamaeleon (Sauneron 1972) Agamis (Leitz 1997: 143) Chamaeleon (Aufrère 2012a: 258)	Chamaeleonidae, Agamidae

The third cluster is that of the vipers *fy* (26-31), which appear grouped together in the text. The word *fy* is absent from the *Wörterbuch der ägyptischen Sprache* (Grapow 1955a-c) in this form and seems to appear exclusively in our text and in *Demotiches Glossar* (Erichsen 1954: 144; *CDD*: F, 6) where it probably simply represents the name of sign I9 𓆑. The general meaning of "viper" is very clear from the way the term is used in the Treaty (see below paragraph "Hierarchization and other clusters"). Snakes of this group are mostly characterized by their wide head, narrow neck, and thick tail and symptoms from a bit include spasms, fever, shivers and swollen bitten points which can let out blood. Other characteristics may be added: vipers 26 and 27 both have colored spots on their heads; 28 and 29 are distinguished by the presence or absence of horns. It is quite normal the Egyptian writer would decide to put these snakes one after the other because of their very peculiar shapes and the similar treatment that the patient required.

The fourth cluster groups together harmless snakes (36, 37). The *sbd*-snake (36) and the one that follows (37) are explicitly assimilated by the text (similarity of the tail and both harmless). Note that they are mentioned at the end of the Treaty (together with the harmless snake 34, although is not directly linked to snakes 36 or 37). The identity of the *r3-bḏḏ* (35) instead is not very clear because of the fragmentary status of the text and different hypotheses can be made (see Table 1).

The list, finally, ends with a beast called *k3r3*, which its editor considered to be the chameleon (Sauneron 1972; see also Aufrère 2012a: 258), while Leitz (1997: 143) suggested was an agama, an identification supported also by Hansen (2003: 290), who also considers it possibly as a gecko. Although the identification as agama is not impossible, some characteristics speak in favor of the chameleon: its green-white color, the three protuberances on its head, its ability to change color. Even if this last characteristic is not peculiar to the chameleon but is shared also by *Trapelus mutabilis* Merrem, 1820 (see *Agama mutabilis* without author quoted by Leitz 1997: 143), the exact number of protuberances and its color are more characteristic of the chameleon, and possibly, given the two species of this genus present in Egypt, of the *Chamaeleo chamaeleon* Linnaeus, 1758 (Fig. 4; Baha El Din 2006: 142). Agamidae species on the other hand have at the most a series of prickles on their back (Baha El Din 2006: 118-119), which is more suitable for the word *3t* ("back"; Grapow 1955a: 26.3-6) in the text. The two feet mentioned for the animal is a mistake from the scribe or the observer. The chameleon's presence in the list should not be considered so strange, if we remember that chameleons

are thought to be poisonous and are objects of superstition in some parts of Africa (Spawls *et al.* 2018: 243) or Asia (Sharma & Koli 2018: 60).

It must be underlined however that this animal, although explicitly possessing feet, is classified with the hieroglyph I12  and is included completely in the Egyptian snake (or reptile?) category (for similar cases see Aufrère 2015a: 49). Its presence at the end of the snakes list, however, is most probably not random.

Hierarchization and other clusters

Hierarchization implies another level of clustering based on more specific (vertical) relationships. Today, we talk about "taxonomy", but for an Egyptian the question was naturally different and involved several strategies.

However, it must be said that the Treaty reveals that the Egyptians themselves (at least in this late period) had a peculiar classification comparable to our taxonomy: only two spurs of this remain. The first snake preserved (14) on the list is said to belong to the family of *ḫt-wʿt e k3-nʿy*; while the *sdb* (20) is said to belong to the group of *msw-bdš* (and maybe also the *r3-bḏḏ* [35]; see Sauneron 1989: 32). Nothing can actually be said about these names, whose reading is just hypothetical since they appear to us as *hapax*, but it is nevertheless worthy of mention (Sauneron 1989: 8, 9, 32).

More important is the word *fy* (see also Aufrère 2015a: 27). The fact that Egyptians had a general word for the snakes of this family is not so surprising, since a lot of modern languages do. Vipers are themselves quite peculiar and easily recognizable because of their short length, their massive body, the tail which suddenly shrinks at the end and their triangular shaped head. Furthermore, this is perhaps the family with the largest number of poisonous snakes and their negative relationships with humans are frequent, so it is understandable that this scientific treatise should have had focused on them to a large extent. The case of the vipers can reveal other strategies of hierarchization. The word can be used either alone (26, 30) or with a specification (27: *fy nf*, "blowing viper"; 90: *fy ʿ3*, "big viper"; 29: *fy šry*, "little viper"; 31: *fy ṯzy*, "male viper"; 28: *fy ḫr ḏb.wy*, "viper with horn"; 22: "*fy tj-ʿm*", probably to be read *t3-ʿm*, "Asiatic viper") or even independently as a second member of a nominal construction (33: "relating to the blowing snake, this is a viper [*fy*]). This makes of *fy* a basic level term, contrary to our modern folk taxonomy, where the "viper" must probably be considered a category of subordinate level with respect to the one of "snake" (Berlin 1992: 69-73).

The construction "general name + specification" (see also Brown 1984: 1-8), where the general name constitutes the superior group and the animals with specification appear as subordinate-level members, can be observed also for the *ḥnp*-snake and the *ḥnp dšr* (red *ḥnp*), even if in this case the existence of a general *ḥnp* as superior group is not clear as it is for the vipers *fy*.

Finally, a general organizing trend must be underlined. While the real beginning of the text is unfortunately lost, the remainder of the list starts with snakes of the Elapidae family, followed by a main corpus made up mostly of vipers (family of Viperidae), and then towards the end, the less dangerous snakes (perhaps mostly belonging to the family of Colubridae); the list finally ends with the chameleon, an animal which is not a snake at all (at least according to our own conceptualization). Some exceptions are surely present: the *nbd* snake is said to be harmless but comes before the triad *tj-ʿm/ḥnp/ḥnp* and after the *sbd*-snake (maybe for reasons of homophony). The position of the *nkj* snake (not a viper), which has the body like a lotus stem, can be explained by the intention of the author to put him near to the following snake (a viper), which has the image of the lotus on his head. The identity of the *ʿrʿr* snake, on the other hand, like that of *r3-bḏḏ*, is not very clear: the first has been identified as a cobra (see Table 1), that is an Elapidae, but the *Malpolon moilensis* Reuss, 1834 (a colubrid) is a more convincing an identification, because of the three non-lethal marks its bite leaves and its ability to raise its head. Nothing in turn can be said about the *r3-bḏḏ* snake, because the text is incomplete here.

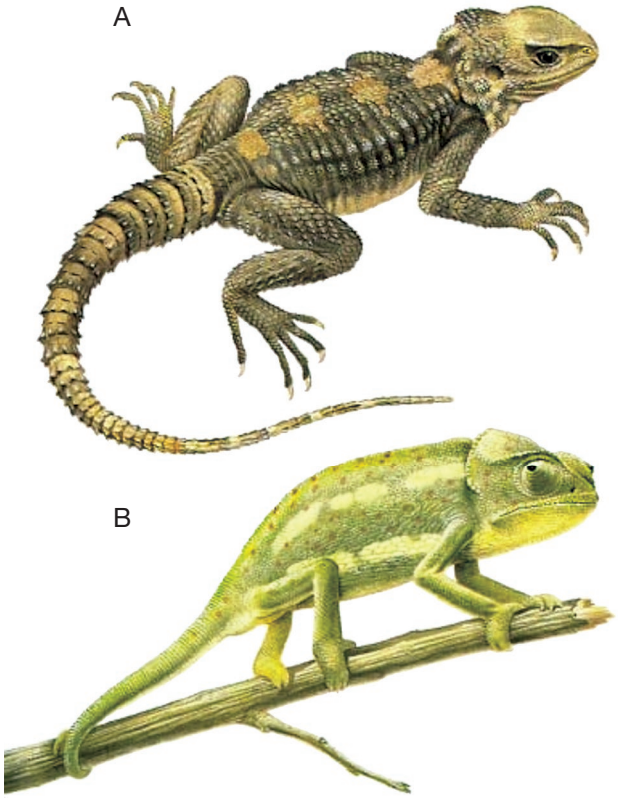

Fig. 4. — **A**, *Stellagama stellio* Linnaeus, 1758; **B**, *Chamaeleo chamaeleon* Linnaeus, 1758. Credits: Arnold & Burton. (1978: Tav. 16).

Comparisons

This list can be compared with the works of Greek authors, who have transmitted to us similar texts about snakes with their descriptions. We will focus on Nicander of Colophon (III-II century BC.) and his poem *Theriaká*, with some references also to others where possible. Naturally, the corpus of Greek *iologoi* is much wider (see Zucker 2012 for a complete reference).

Clustering in Theriakà (*Th.*)

The structure of the section about snakes in Nicander's poem (*Th.* 157-492) is carefully constructed. The author describes fourteen snakes one after another, which may be divided in two groups of seven (Jacques 2002: lxxiv). The first group opens with the cobra, considered the most dangerous of the animals which attack by biting. After this, the vipers follow with their descriptions, divided into females and males. Then three snakes, each one compared to the previous species for their body shapes, are described. The cerastes is compared to the male viper (Nicander, *Th.* 259), but has either two or four horns according to the author (Nicander, *Th.* 261); the blood-letting snake (αἱμόρροος) is similar to the cerastes (Nicander, *Th.* 294-295), but has just two horns (Nicander, *Th.* 291); the sepedon then is said to be like the blood-letting snake, but Nicander explicitly says that it has no horns (Nicander, *Th.* 320-323). So, these three snakes follow a gradation in the number of horns they have, although they are alike in their body shapes. Then comes the dipsas, which is linked back to the female viper (Nicander, *Th.* 334-335), whose appearance is similar. Finally, the following chersydrus is said to be shaped like a cobra (Nicander, *Th.* 359-360), thus referring back to the very first entry of the text and creating a circular composition.

It should be noted that the cerastes, the blood-letting snake, and the sepedon, each linked to the previous one (and finally to the male viper) because of their shapes, are emphatically grouped together, and the difference between them consists only of an exterior marker. Something similar can be said about the dipsas and the female viper, and about the cobra with the chersydrus: they share a similar appearance and can be clustered together, even if Nicander (for poetical reasons, as he uses them to build a circular composition) mentions them far apart from each other.

The second group presents a less compact structure. It opens with the amphisbaena (Nicander, *Th.* 372-383), followed by the scytale (Nicander, *Th.* 384-395), whose bodies are alike. Both snakes are harmless and the effects of their bites are not described. Then comes the basilisk (Nicander, *Th.* 396-410), the king of snakes, which is probably a reptile with feet (see below). Thereafter, the chelydrus is described, whose peculiarity is to live on beech trees and oaks: the dragon, an inoffensive snake with shiny (ἄγλαυρος) skin, which the Healer god raises on a beech (Nicander, *Th.* 439) and the cenchrines with shiny skin. The section is closed by the gecko (Nicander, *Th.* 483-487), a reptile with feet.

It is noteworthy how Nicander arranges the animals: the basilisk (dangerous) symmetrically opposed to the gecko (harmless) and the dragon (harmless) in between the chelydrus and the cenchrines (both dangerous). He thus alternates them so as to build again a fine literary construction, but also takes inspiration from the real characteristics of each snake.

The section about snakes is concluded by an appendix on completely harmless snakes: Nicander only mentions their names (Nicander, *Th.* 488-492).

We must clarify why the basilisk is here considered to have feet (although its identity is still under discussion). Wellmann (1887) did not propose any identifications for this beast, which he considered simply as a "*fabelhaftes Tier*", while Gossen & Steier (1921) assumed that the basilisk could be an agama. Alexander (1963), on the other hand, suggested that this redoubtable reptile could have come from the Egyptian representations of the cobra because of the erect posture, but the length of the basilisk given in the Greek descriptions (Nicander, *Th.* 396-407; Philumenus, *Ven.*, 31; Aetius Amidenus, *Lib*. XIII, 34; Aelius Promotus, περὶ τῶν ἰοβόλων θηρίων, 27; Plinius, *HN*, VIII, 33; Aelianus, *NA*, II, 5-7) are much shorter than the dimensions of the cobra, and the symptoms of its bite do not correspond to the neurotoxic venom of *Naja* sp. Linnaeus, 1758. Furthermore, the Greeks had already a very specific name for this well-recognizable snake. Barbara (2006) proposed that at the model for this fabled animal could have been *Echis pyramidum* Geoffroy Saint-Hilaire, 1827, because of the symptoms described by Nicander, the small length, and the spot on his head (Democrites in Aelius Promotus, περὶ τῶνὶ οβόλων θηρίων, 27; Plinius, *HN* VIII, 33), but he did not consider its semi-erect position (Plinius, *HN* VIII, 33), which rather evokes a reptile such as the agama. Leitz (1997) suggested, comparing the *kzrz* description with that of the basilisk, that this one could have been an agama, which appears to be the most convincing hypothesis so far. The problem that species of the Agamidae family are not poisonous can be dismissed when we consider that harmless chameleons and geckos are also erroneously considered to be dangerous.

To sum up, the criteria used to group these snakes are:
– the exterior appearance of the body alone: cobra-chersydrus; female viper-dipsas;
– exterior appearance of body + marker (horns): male viper-cerastes-blood-letting snake-sepedon;
– exterior appearance of body + danger/harmless: amphisbaena-skytale;
– ecology: chelydrus-dragon (beech);
– exterior markers alone: basilisk-gecko (feet); dragon-cenchrines (shiny skin);
– danger/harmlessness alone: alternation in the second part of dangerous and harmless snakes (basilisk-gecko; chelydrus-dragon-cenchrines).

Hierarchization in Theriakà (*Th.*)

Is it possible to detect vertical relations within the groups underlined in the above? Signs of hierarchization are quite limited because of the structure, which is organized also according to poetic criteria. Some brief observations can still be made, however.

The cobra, firstly, is located at the beginning of the section about snakes, which is not random but is rather because it is considered the most venomous of snakes (Nicander, *Th.* 188). Furthermore, Philumenus of Alexandria (III century AD) distinguished three types of cobras according to their length, color and activity (Philumenus, *Ven*. 16): χερσαῖα ἀσπίδες (earthy cobras), χελιδονίαι ἀσπίδες (cobras with color like the swallow) and the πτυάδες ἀσπίδες (the spitting cobras). These types represent members of the superordinate group of cobras.

Vipers instead are distinguished by Nicander according to gender, geographical place and shape. He differentiates a female viper, and, among these, differentiates the ones which live in Europe, with a horn on their nose and shorter body, and the ones which live in Asia, bigger but without horn. The male vipers are characterized by a pointed snout without any geographical subdivisions. Distinction based on the gender (male-female) is made also by Philumenus about the blood-letting snake (Philumenus, *Ven*. 21).

The cerastes, the blood-letting snake, and the sepedon, all of them recalling the shape of the male viper, could all be considered its subordinate members, but this is not explicitly affirmed by the author.

The dragon-snake, while it is not specified by Nicander, is divided by Philumenus (*Ven.* 30) depending on its color (black, reddish, ash grey) or its length (5, 10, 15, 20, 30 cubits). But the dragons described by the two authors are probably two completely different snakes: the one described by Nicander, whose bites are not bigger than the ones a mouse gives, is possibly an *Elaphe* Wagler, 1833 sp. (Bodson 1981: 69), while the other one described by Philumenus is provided with big teeth which break human bones and must be a *Python* Daudin, 1803 sp. (Jacques 2002: 136-138; see Table 2).

The harmless snakes, finally, are collocated at the end of the list (like in the Egyptian Treaty), because hierarchically less important, at the opposite end to the cobra. Vipers, which are dangerous, are likewise well-grouped and recognized as in the Egyptian list. As for Nicander's remaining snakes mentioned above, it is difficult to say which vertical relations link them all, if they indeed exist.

It should be noted at the end of this brief overview that the strategies of hierarchization used by Nicander and Philumenus are similar to the Egyptian ones, especially the use of an adjective as a specification after a superordinate name. These adjectives reveal criteria of distinction which mostly cover the same spectrum which we find in the Egyptian Treaty: color, gender, physical shape, place of provenience, characterizing behavior (see the blowing viper and the spitting cobra). Naturally these are cultural phenomena which must be considered independently originated and developed, however.

STATISTICAL METHOD IN CONTEXT

Statistical methods can prove useful when it comes to detecting ancient categorization through a lexicographical study.

We selected five words commonly translated as 'snake' or words which might relate to snakes – so as to distinguish and highlight differences in semantic areas and contexts of use. These are: *fnṯ* (Grapow 1955a: 577.5-7), *ḥfȝ* (Grapow 1955b: 72-73.5: *ḥfȝ.w* + *ḥfȝ.t*), *sȝ-tȝ* (Grapow 1955b: 410.16-17), *ḏdf.t* (Grapow 1955c: 633.6-634.3), *jmj-tȝ* (Grapow 1955a: 75.17). Occurrences in the database of the *Thesaurus Linguae Aegyptiae* (adding only the *ḥfȝ* of the relief of Djedkara analyzed *supra*) have then been used for the table below and all the data has been divided considering two factors: distribution across time, and across textual genres, trying to detect possible changes in the use of these words. As far as time is concerned, the classical Egyptological division (Old-Middle-New Kingdom: see Hornung *et al.* 2006: 490-495) has been adopted, merging the Intermediate Periods with the preceding age, and Third Intermediate Period with the Late Period, because of the lack of occurrences in this latter age. With regards to the dating of the 'snake-word' as it occurs in each text, the dating of the edition indicated in the *Thesaurus* has been used. Regarding textual genres, they have been divided as follows. Funerary texts refer to Pyramid Texts, Coffin Texts, Book of the Dead, and all those inscriptions in tombs aiming to help the deceased cross the netherworld and defy their enemies. Medical texts are easily defined, and the same can be said of magical texts, which comprise also some magical spells in medical papyri, where it can be easily deducted from the context that a real snake is meant and not a disease caused by a "sworm" creature. Literary texts include narrative history, hymns and poetry, and the so-called teachings, made up mostly of proverbs. Ritual texts comprise all the ritual spells that are supposed to have been said during ceremonies, while mythological texts cover texts on the myths and legends of the gods, even if one could consider them in some respects to be literary or funerary. The label "other" includes administrative texts and most fragmentary texts, whose topic cannot be easily determined.

The data, displayed as a percentage of the total occurrences in each age, is shown in Fig. 5.

DISCUSSION

While it is not within the scope of this paper to propose a thorough lexicographical analysis of each word, some brief observations can still be made on the basis of this data.

Firstly, each word has a specific distribution across the different genres and ages:

– *jmj-tȝ*[4] appears exclusively in funerary texts from the New Kingdom onwards;

– *sȝ-tȝ* ("son of the earth") predominates in funerary and ritual texts;

– *fnṯ*, in the Old Kingdom and in the Middle Kingdom, appears just in funerary texts and indicates a creature of the netherworld (see below), while in the New Kingdom the word has diversified its meanings and takes an important part in the medical texts as intestinal worm (see below);

– *ḏdf.t* appears almost equally in each textual genre, but occurs only from the New Kingdom onwards;

– *ḥfȝ* (*ḥfȝ.w* + *ḥfȝ.t*) predominates in almost all fields from the Old Kingdom onwards.

Taking into consideration only the medical texts of the New Kingdom, three words appear: *ḥfȝ* (61,5%), *fnṯ* (30,8 %) and *ḏdf.t* (7,7%). These indicate worms in all cases: *ḥfȝ* seems to be specific for intestinal worm (Eb 50, 53, 55, 64, 65, 66, 68, 70), *fnṯ* possibly for worms which emerge from putrefaction (L 14, 30, 55), and *ḏdf.t* appears once in the generalizing expression "all the worms which are in his body" (Eb 64).

4. For *jmj-tȝ* and *sȝ-tȝ*, the occurrences analyzed are still fewer that the standard number of 100 occurrences, and the research shows only preliminary results, while for the other terms, the data is much more complete and reliable.

TABLE 2. — Suggested identifications for the reptiles of the Nicander's *Theriaká*. Scientific names are here without author because they are presented this way in the quoted works.

Nicander	Possible identifications	Modern family
ἀσπίς (cobra)	*Naja haje* (Gossen & Steier 1921: 524; Jacques 2002: 97; Gow & Scholfield 1953: 173) see also Overduin (2014: 248)	Elapidae
Just Philumenus: χερσαῖα ἀσπίδες χελιδονίαι ἀσπίδες πτυάδες ἀσπίδες	 *Naja haje* (Leitz 1997: 46) *Walterinnesia aegyptia* (Leitz 1997: 46) *Naja mossambica pallida* (Leitz 1997: 46)	
ἔχιδνα (female viper)	See ἔχις	Viperidae
ἔχις (male viper)	*Vipera ammodytes* or *V. aspis* (Jacques 2002: 103; Gossen & Steier 1921: 537) *Pelias berus* and *Vipera aspis* (Gow & Scholfield 1953: 174) *Vipera ammodytes* (Leitz 1997: 103) see also Overduin (2014: 267)	Viperidae
κεράστης (*Cerastes cerastes*)	*Cerastes cerastes* (Gossen & Steier 1921: 544; Gow & Scholfield 1953: 175; Keller 1980: II 297; Jacques 2002: 111; Leitz 1997: 64) with different nomenclature see also Overduin (2014: 284)	Viperidae
αἱμόρροος (a viper)	*Vipera latastei* or *Echis carinata* (Gossen & Steier 1921: 521, 522) a form of cerastes, *Echis carinatus* or *Pesudocerastes fieldi* (Gow & Schowfield 1953: 175) a confusion of Nicander (Jacques 2002: 114) *Cerastes vipera* (Leitz 1997: 72) see also Overduin (2014: 290)	Viperidae
σηπεδών (a viper)	Unidentifiable (Gossen & Steier 1921: 552; Gow & Scholfield 1953: 176) probably a viper of genus *Bitis* (Jacques 2002: 117) *Echis pyramidum* (Leitz 1997: 81) see also Overduin (2014: 303)	Viperidae
διψάς (a viper)	*Cerastes vipera* (Gossen & Steier 1921: 531) *Vipera prester* (Gow & Scholfield 1953: 176) a viper (Jacques 2002: 119) *Pseudocerastes persicus* (Leitz 1997: 94) see also Overduin (2014: 306)	Viperidae, Colubridae
χέρσυδρος (probably a viper)	*Lauticauda laticaudata* (Gossen & Steier 1921: 555), *Tropidonotus natrix* (Keller 1980: II 298), both probably wrong (Gow & Scholfield 1953: 177), a form of chelydros? (Jacques 2002: 122-124) *Vipera lebetina* (Leitz 1997: 115) a hybrid between the *Malpolon monspessulanus insignatus* Geoffroy, 1827 and the *Natrix tessellata tessellata* Laurenti, 1768 (Aufrère 2012b) see also Overduin (2014: 323)	Probably Viperidae
ἀμφίσβαινα (a worm-snake, inoffensive)	*Typhlops vermicularis* (Gossen & Steier 1921: 524; Leitz 1997: 18) fabulous (Gow & Scholfield 1953: 177) *Blanus strauchi* (Leitz 1997: 18) see also Overduin (2014: 326)	Typhlopidae or Blanidae
σκυτάλη (a worm-snake, inoffensive)	Unidentifiable (Gossen & Steier 1921: 553; Gow & Scholfield 1953: 178) *Eryx jaculus* (Leitz 1997: 22) see also Overduin (2014: 329)	Boidae
βασιλίσκος (basilisk, not a snake)	An agama or fabulous (Gossen & Steier 1921: 529) fabulous (Gow & Scholfield 1953: 178) an agama (Leitz 1997: 142) see also Overduin (2014: 331)	Agamidae
δρυίνας or χέλιδρος (a viper)	*Vipera berus*? (Gossen & Steier 1921: 537) *Vipera lebetina*? (Gow & Scholfield 1953: 178) a viper (Jacques 2002: 134) *Vipera berus* (Leitz 1997: 127) see also Overduin (2014: 336)	Viperidae
δράκων (python or elaphe, not venomous or inoffensive)	*Python sebae* (Gossen & Steier 1921: 532) fabulous (Gow & Scholfield 1953: 179) or *Python molurus* (Gow & Scholfield 1953: 179) *Elaphe longissimi* or *E. quadrivittata* (Bodson 1981: 69) *Python sebae* and *Elaphe quatuorlineata* (Leitz 1997: 21, 29) see also Overduin (2014: 342)	Pythonidae Colubridae
κεγχρίνης (possibly a viper)	*Zamenis gemonensis* (Gossen & Steier 1921: 523) *Pelias berus*, *Vipera ammodytes* or fabulous (Gow & Scholfield 1953: 179), *Vipera* (*Daboia*) *xanthine* (Leitz 1997: 119) see also Overduin (2014: 351)	Colubridae, Viperidae
ἀσκάλαβος (gecko, not a snake)	*Platydactylus muralis* (Jacques 2002: 143) see also Overduin (2014: 361)	Phyllodactylidae

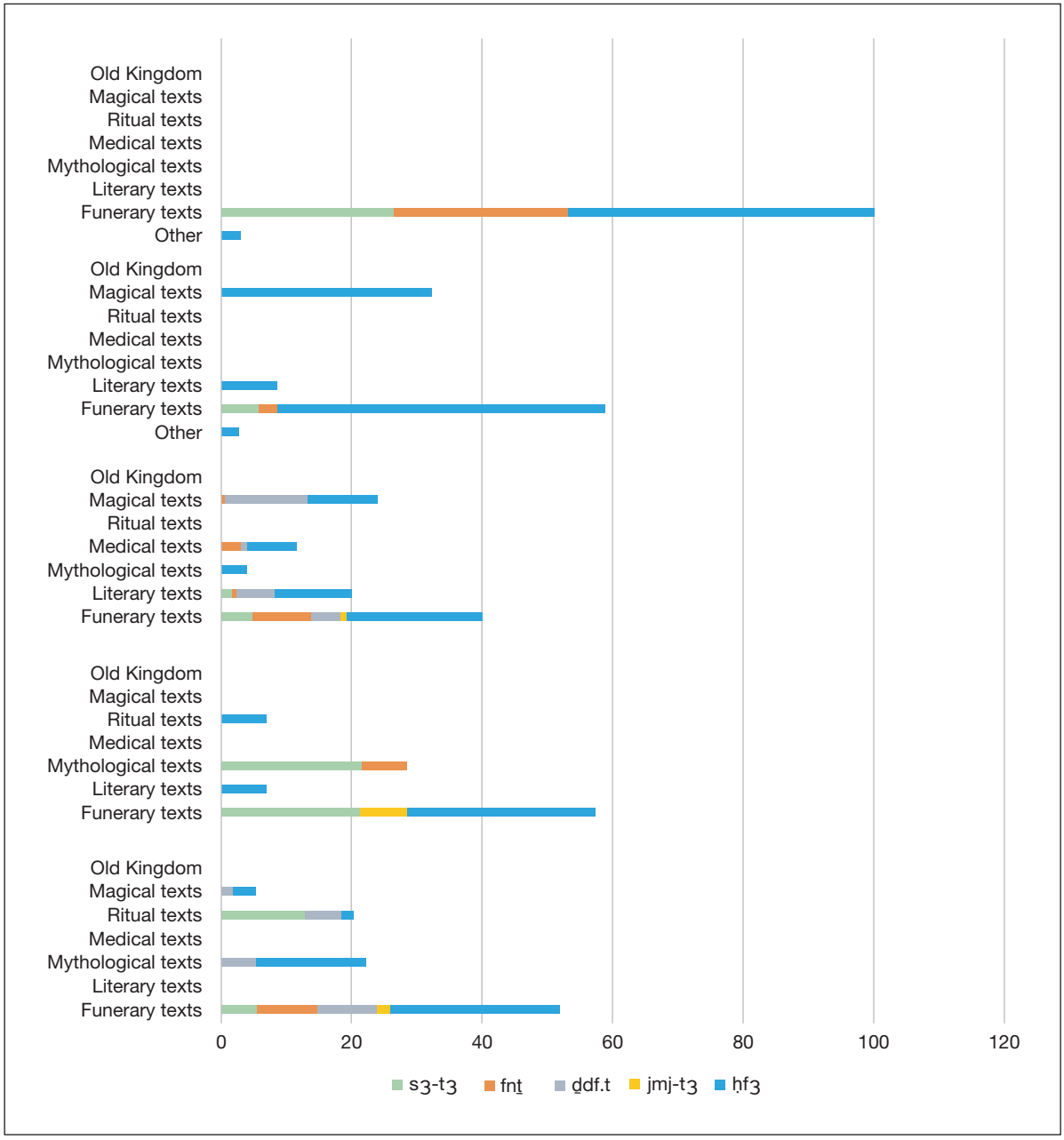

Fig. 5. — Distribution of use of the words for "snake" across time and textual genres.

If we consider that we can detect changes in a word's meaning within a specific genre across time, funerary texts offer the best opportunity to see this process in action. *S3-t3* appears during the Old and Middle Kingdom as an aggressive creature of the netherworld (Faulkner 1969: 727; 2004: 885 VII97s; 98i), but in the New Kingdom, it starts to hold a more positive connotation: the deceased turns into a *s3-t3* and this allows him to go through his travel (Quirke 2013: 87). Even later on it continues to have the function of protection outside the funerary corpus (Chassinat 2008b: 108.10-11). *Fnṯ* instead continues in the New Kingdom to have the positive connotation it seemed to have in the previous periods (Faulkner 1969: 291; 2004: 885, VII96f; Quirke 2013: 78), but while included in medical texts as "worm", it simultaneously starts to appear in the Book of Dead in connection to the fear of the dead, who rot and produce worms (Quirke 2013: 154).

If we subsequently try to calculate the most frequent words which are associated with the words we are analyzing (subsequently called xi), and consider a "window" of ten words (five before the word we are studying and five after it), the most notable result is that in 52.5% of its occurrences *ḏdf.t* is coupled (that is, it appears in the second position after xi) with the adjective *nb.t* (each, every).

This method represents a variation on the Markov assumption ("the assumption that the probability of a word depends only on the previous word": Jurafsky & Martin 2018: 40) and it can be

read also as an answer to the question "what is the probability that given the *ḏdf.t* word there will be a *nb* adjective after it?". The result is not a mere curiosity, but affects also considerations about the meaning of the word, because it points out that its possible value is large and can embrace several concepts. This term occurs often in generalizing expressions as in the formula "every beast, every bird, every fish, every *ḏdf.t*" (for example see Garis Davies 1903: pl. 36, line 4; 1905: pl. 29, line 4; Chassinat 2008a: 114.10-11) and one might be tempted to translate this last example as "every reptile". However, a variant of the formula of the Book of Dead, where *ḏdf.t nb.t* is preceded by *ḥfȝ.wt nb.t* (Quirke 2013: 154), goes against this interpretation, so that here it is better translated as "every worm" (Allen 1960: 279; Quirke 2013: 383) and it could be considered the most general term for this category (coherently with Eb 64). The meaning of the word is, however, even wider as Meeks (2012: 535, 536) and Aufrère (2015a: 24; 2017) demonstrated, and it embraces all the creatures of the earth, water and air "capable d'infliger morsure, piqûre, griffure ou pincement" (Aufrère 2015a: 26). It can be added that the modern-day Bedouins of the Khushmaan Ma'aza tribe, from the northern part of the Egyptian Eastern Desert, have, in a similar way, a general word (*dûd*), which means literally "worm", but which incorporates also "spiders, centipedes, ants, ticks, caterpillars, snails, beetles" (Goodman & Hobbs 1994: 78) and "crawling, nonruminating, unclean animals" (Goodman & Hobbs 1994: 97). For the word *ḏdf.t*, then, it is clear that statistics, lexicography and ethnographical comparisons all agree in the same way.

Some considerations must be offered in view of possible future improvements. As we can see, most of the occurrences are concentrated in funerary texts. This is firstly because the research is affected by the corpus of the *Thesaurus* (but also by the kind of texts that Egypt itself transmitted to us) and secondarily by the subject itself: snakes certainly play a significant role in the netherworld. Thirdly, the division into genres in some cases is purely conventional and might have affected the representation of the data in the above graph. Moreover, the dating of each text, which can be a copy of an older script, could be considered more carefully. Finally, future research could also consider other words for snakes such as *qrr* (Grapow 1955c: 62.11), *rʾ(ȝ)* (Aufrère 2019: 33) or *qrḥ.t* (Aufrère 2019: 50).

Despite these caveats, from this brief overview it can be concluded that *jmj-tȝ* and *sȝ-tȝ* are the most specific designations for 'snake' and are almost completely limited to the funerary and mythological world. *Fnṯ*, which appears also as a creature of the netherworld, seems to become more specialized from the New Kingdom onwards with the meaning as "worm" rather than "snake" (even if a literary text mentions once its teeth: Gardiner 1937: 49, line 13.7). *Ḥfȝ* remains the most common and flexible word to indicate every creeping (or apparently creeping) and potentially dangerous creature, such as snakes, worms and possibly skinks (see also Meeks 2012: 535; Aufrère 2015b: 95). *Ḏdf.t*, which appears just in the New Kingdom and which could have created some shifts of meaning in the other snake-related terms, seems to be concentrated in a fixed formula with a very generalizing meaning embracing almost "every creature able to cause poisoning or infection through its bite, sting or scratch" (Aufrère 2015a: 26).

CONCLUSIONS

The three methods here used (determinatives, lists, statistics) are ultimately lexicographical approaches, but each one can show a slightly different aspect of the way reptiles were considered in the ancient Egyptian world. Determinatives apply directly to the word they refer to, establishing with them different relationships (Goldwasser 2006) and these enable us define a whole category (what word has that classifier?) as well as establish borderline cases. Lists on the other hand are more useful for detecting both hierarchization and sub-clusters inside a category and the criteria according to which these sub-categories are culturally established. Comparisons with other cultures have been here employed in order to better understand this phenomenon, but deterministic conclusions relying on this method should of course be avoided. Finally, statistical methods, which are helpful in several ways, have been used to reveal differences in usage of the "snake"-words.

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